**IN THE CLAIMS**:

The following is a complete listing of the pending claims.

1. (Previously Presented) A packet switching fabric:

having a plurality of output queuing controlled switching devices coupled together by a data ring and a control ring so that network links can be communicatively coupled, each said switching device comprising:

data ring processing means for transmitting and receiving bursts of data to and from adjacent ones of said devices via said data ring,

network interface means having at least one network port for transmitting and receiving data packets to and from said network links,

packet buffer means for storing the received data packets,

source managing means communicatively coupled to said data ring processing means, and providing an interface between said network interface means and said packet buffer means, said source managing means being operative to develop pointer information for said received data packets, and also being operative to develop an associated destination one of said network ports associated with each one of said received data packets, the pointer information and the associated destination identification providing local announcement information serving as a local request for access to said associated destination network port, the pointer information and the associated destination associated with each one of said transfer packets providing transfer announcement information,

control ring processing means responsive to said transfer announcement information, and operative to transmit and receive control messages to and from adjacent ones of said devices via said control ring, said control messages including announcement messages, said control ring processing means also being operative to provide received transfer announcement information in response to each received one of said

announcement messages, said received transfer announcement information serving as a remote request for access to said associated destination network port, and

destination managing means communicatively coupled to said network interface means, and responsive to said local announcement information and said received transfer announcement information, and operative to arbitrate between competing ones of said local and remote requests for access to each of said network ports, and also operative to generate transfer notification information associated with selected ones of said transfer data packets.

2. (Original) A packet switching fabric as recited in claim 1 wherein said transfer announcement information associated with each one of said transfer data packets further includes source identification information indicating said associated source device.

3. (Original) A packet switching fabric as recited in claim 1 wherein:

said network interface means includes a plurality of transmit buffer queues each providing for receiving data from said destination managing means, and for transmitting bursts of data to a corresponding one of said network links via a corresponding one of said network ports; and

said destination managing means includes an output buffer manager for monitoring the availability of buffer space in each of said transmit buffer queues, and wherein each of said notification messages is transferred via said control ring means after a determination by said output buffer manager that an associated destination one of said transmit buffer queues, that is connected to said associated destination network port, includes a threshold amount of available buffer space.

4. (Original) A packet switching fabric as recited in claim 3 wherein said output buffer manager is operative to determine a number of blocks of buffer space available at each of said transmit buffer queues, each of said available blocks providing buffer space sufficient for receiving a burst of packet data from said destination managing means.

5. (Original) A packet switching fabric as recited in claim 4 wherein said notification information further comprises an initial channel credit value indicating of a number of available blocks at the destination transmit buffer queue associated with said selected transfer data packet prior to transmitting said associated notification message.

6. (Original) A packet switching fabric as recited in claim 1 wherein said packet buffer means includes at least one memory unit communicatively coupled with said source managing means via a corresponding memory unit link, and wherein each of said devices receives a channel resource patrol message from an adjacent one of said devices, said patrol message carrying channel bandwidth information indicative of bandwidth available on said data ring means and bandwidth available on said memory unit links, said control ring processing means being responsive to said channel bandwidth information and operative to read and modify said channel bandwidth information for the purpose of managing data transfer via said data ring means and via each of said memory unit links.

7. (Original) A packet switching fabric as recited in claim 1 wherein:

said data ring means includes a plurality of data ring segments each coupling a corresponding adjacent pair of said devices together;

said packet buffer means includes at least one memory unit communicatively coupled with said source managing means via a corresponding memory unit link; and

each of said devices is responsive to a channel resource patrol message received from an adjacent one of said devices, said patrol message carrying channel bandwidth information including,

a plurality of data ring segment bandwidth parameters each being indicative of an amount of bandwidth currently available at a corresponding one of said data ring segments, and

a plurality of memory unit link bandwidth parameters each being indicative of an amount of bandwidth currently available at a corresponding one of said memory unit links;

said control ring processing means being responsive to said channel bandwidth information, and being operative to read and modify said channel bandwidth information for the purpose of managing data transfer via corresponding ones of a plurality of source-destination channel paths for transmitting associated ones of said selected transfer data packets from said associated source device to said associated destination device, each of said paths including corresponding ones of said data ring segments and a corresponding one of said memory unit links.

8. (Original) A packet switching fabric as recited in claim 7 wherein said patrol message is transferred via said data ring, and wherein said control ring processing means is communicatively coupled with said data ring processing means.

9. (Original) A packet switching fabric as recited in claim 7 wherein said control ring processing means is operative to read selected sets of said data ring segment bandwidth parameters and said memory unit link bandwidth parameters of said patrol message in response to said transfer notification information, each of said selected sets of bandwidth parameters being associated with one of said source-destination channel paths, said control ring processing means being further operative to determine a maximum amount of bandwidth currently available for transmitting data via each of said source-destination channel paths based on said associated selected set of bandwidth parameters.

10. (Original) A packet switching fabric as recited in claim 9 wherein said control ring processing means is further operative to determine an initial channel rate value associated with each one of said selected transfer data packets, each said initial channel rate value indicating an initial channel rate for transmitting bursts of said associated selected transfer data packet from said packet buffer means of said associated source

device to said associated destination device via said associated source-destination channel path.

11. (Original) A packet switching fabric as recited in claim 10 wherein each of said notification messages comprises:

a destination identification field for carrying said associated destination identification information;

a source identification field for carrying said associated source identification information;

a packet location pointer field for carrying said associated pointer information;

an initial channel credit field for carrying said associated initial channel credit value; and

an initial channel rate field for carrying said associated initial channel rate value.

12. (Original) A packet switching fabric as recited in claim 11 wherein:

said control ring processing means is responsive to received ones of said notification messages, and operative to provide received notification information associated with each one of said received notification messages, said received notification information including said associated source identification information, said associated destination identification information, said associated pointer information, said associated initial channel credit value, and said associated initial channel rate value; and

said source managing means is further responsive to said received notification information, and operative to transfer data bursts of said associated selected transfer data packet from said packet buffer means to said associated destination device via said associated source-destination channel path in accordance with said associated initial credit value and said associated initial channel rate value.

13. (Original) A packet switching fabric as recited in claim 12 wherein said source managing means further comprises:

a source channel control unit responsive to said received notification information, and operative to generate an initial channel data transfer signal associated with each one of said received notification messages, each of said initial channel data transfer signals being repeatedly activated a specified number of times in accordance with said associated initial channel rate value, said specified number being determined based on said associated initial channel credit value; and

a packet buffer control unit communicatively coupled to said packet buffer means and to said network ports, said packet buffer control unit being responsive to said initial channel data transfer signals, and being operative to read said specified number of data bursts of said associated selected transfer data packet from said packet buffer means in accordance with said associated initial channel rate value.

14. (Original) A packet switching fabric as recited in claim 13 wherein said source channel control unit comprises:

a channel memory means responsive to said received notification information, and being operative to manage channel information associated with corresponding ones of said source-destination channel paths, said channel information having,

said associated source identification information, said associated pointer information, a current channel credit value indicative of a number of bursts of said selected data packet to be transmitted via said corresponding source-destination channel path, said current channel credit value being initialized to said initial channel credit value, and

a current channel rate value indicative of a channel rate for transmitting bursts of said selected data packet via said corresponding source-destination channel path, said current channel rate value being initialized to said initial channel rate value; and a channel rate timer associated with said corresponding source-destination channel path, said channel rate timer being responsive to said current channel rate value, and being operative to generate a channel rate control signal that is repeatedly activated in accordance with said current channel rate value.

15. (Original) A packet switching fabric as recited in claim 13 wherein said source channel control unit includes:

a channel memory means responsive to said received notification information, and being operative to manage channel information associated with said selected source-destination channel path, said channel information including said associated source identification information, said associated pointer information, said initial channel credit value, and said initial channel rate value; and

a channel rate timer associated with said selected source-destination channel path, said channel rate timer being responsive to said current channel rate value, and being operative to generate said initial channel data transfer signal.

16. (Original) A packet switching fabric as recited in claim 13 wherein:

said output buffer manager is further operative to generate incremental credit transfer information associated with said selected transfer data packet, said incremental credit transfer information indicating an incremental number of available blocks at said destination transmit buffer queue, said incremental number of available blocks having become available since said transmission of said associated notification message;

said control messages further include incremental credit transfer messages developed by said control ring processing means in response to said incremental credit transfer information, said incremental credit transfer message carrying said incremental credit transfer information;

said control ring processing means is also responsive to terminated ones of said incremental credit transfer messages, and operative to provide received incremental credit transfer information; and

said source channel control unit is responsive to said received incremental credit transfer information, and operative to increase said initial channel credit value.

17. (Original) A packet switching fabric as recited in claim 13 wherein:

said control ring processing means is further operative to generate incremental rate transfer information associated with said selected transfer data packet, said incremental rate transfer information indicating an incremental channel rate, said incremental channel rate being determined based on additional channel bandwidth for transmitting data via said associated source-destination channel path, said additional channel bandwidth being indicated by said patrol message, said additional channel bandwidth having become available since said transmission of said associated notification message;

said control messages further include incremental rate transfer messages developed by said control ring processing means in response to said incremental rate transfer information, said incremental rate transfer message carrying said incremental rate transfer information; and

said control ring processing means is also responsive to terminated ones of said incremental rate transfer messages, and operative to provide received incremental rate transfer information; and

said source channel control unit is responsive to said received incremental rate transfer information, and operative to increase said channel rate.

18. (Original) A packet switching fabric as recited in claim 3 wherein each of said data packets is received via a corresponding source port of said network ports, wherein each of said received data packets includes header information specifying a corresponding destination address of a corresponding destination node, and wherein said source managing means further includes a packet routing control unit communicatively coupled to said network ports, and being responsive to said destination addresses, and being operative to generate said destination information associated with each one of said received data packets, said associated destination network port being communicatively coupled to said corresponding destination node.

19. (Original) A packet switching fabric as recited in claim 18 wherein said packet routing control unit is further operative to append each of said data bursts with

block header information including said destination ID value, and an end of packet indicator for indicating whether said data burst is a last data burst of said data packet.

20. (Original) A packet switching fabric as recited in claim 1 wherein each of said control messages includes a message field for indicating a message type of said control message

21. (Original) A packet switching fabric as recited in claim 19 wherein:

said network interface means further includes a receive buffer queue connected to each of said network ports, each said receive buffer queue having an input connected to receive data packets from a corresponding one of said network ports, and an output connected via a bus to said packet routing control means and also to said packet buffer; and

said destination managing unit includes a data distribution control unit coupled to receive said data bursts received by said data processing means, and having a plurality of outputs each connected to one of said network ports via a corresponding one of a plurality of transmit buffer queues, said data distribution control means including means for reading header information of said data bursts and distributing said data bursts to said corresponding said destination ports.

22. (Original) A packet switching fabric as recited in claim 21 wherein said data distribution control means includes a multicast queue for distributing multicast data bursts, having header information specifying multicast addresses, to corresponding multiple ones of said transmit buffer queues for transmission to multiple destination nodes.

23. (Original) A packet switching fabric as recited in claim 3 wherein said transmit queue buffers are not large enough to store a whole one of said data packets and wherein cut through packet transfer is implemented through said transmit buffer queues.

24. (Original) A packet switching fabric as recited in claim 6 wherein each of said memory units is implemented by a dynamic RAM memory unit.

25. (Original) A packet switching fabric as recited in claim 1 wherein at least one of said network links is an Ethernet link having a bandwidth of 100 Mbps.

26. (Original) A packet switching fabric as recited in claim 1 wherein at least one of said network links is an Ethernet link having a bandwidth of 1 Gbps.

27. (Previously Presented) A packet switching fabric having a plurality of switching devices coupled together by a data ring means and a control ring means so that network links can be communicatively coupled, each adjacent pair of said switching devices being coupled together by a corresponding one of said data ring segments, each said switching device comprising:

network interface means having at least one network port for transmitting and receiving data packets to and from said network links,

packet buffer means having at least one memory unit for storing the received data packets,

data ring processing means for transmitting and receiving data bursts of said received data packets to and from adjacent ones of said devices via said data ring means,

source managing means communicatively coupled to each of said memory units via a corresponding memory unit link, and also communicatively coupled to said data ring processing means and said network interface means, said source managing means being operative to develop pointer information for each one of said received data packets, and also being operative to develop destination identification information associated an associated destination one of said network ports of an associated destination one of said devices,

control ring processing means operative to develop, transmit and receive control messages to and from adjacent ones of said devices via said control ring means, said control messages for controlling packet transfer operations including transmitting associated selected ones of said received data packets from said associated source device to said associated destination device via an associated source-destination channel path including associated ones of said data ring segments and an associated one of said memory unit links, said control ring processing means being responsive to a channel resource patrol message received from an adjacent one of said devices, said patrol message carrying channel bandwidth information indicative of bandwidth available on said data ring means and bandwidth available on said memory unit links, said control ring processing means being responsive to said channel bandwidth information and operative to read and modify said channel bandwidth information for the purpose of managing data transfer via said data ring means and via each of said memory unit links, and

destination managing means for receiving data bursts of said received data packets from said data ring processing means, and for providing said data bursts to said associated destination network ports.

28. (Original) A packet switching fabric as recited in claim 27 wherein:

said received data packets include transfer packets received at an associated source one of said devices that is different from said associated destination device, and local packets for which said associated destination network port is a port of said associated source device, the pointer information and destination identification information associated with each one of said local packets providing local announcement information serving as a local request for access to said associated destination network port, the pointer information and destination identification information associated with each one of said transfer packets providing transfer announcement information;

said control ring processing means is responsive to said transfer announcement information, said control messages including announcement messages each being associated with one of said transfer data packets and carrying said associated transfer

announcement information, said control ring processing means also being operative to provide received transfer announcement information in response to each received one of said announcement messages, said received transfer announcement information serving as a remote request for access to said associated destination network port;

said destination managing means is responsive to said local announcement information and said received transfer announcement information, and operative to arbitrate between competing ones of said local and remote requests for access to each of said network ports, and also operative to generate transfer notification information associated with selected ones of said transfer data packets; and

said control messages further include transfer notification messages developed by said control ring processing means in response to said transfer notification information, each said notification message being associated with one of said transfer data packets and carrying source identification information indicative of said associated source device, each said notification message indicating to said associated source device that said associated selected transfer data packet has been granted access to said associated destination network port.

29. (Original) A packet switching fabric as recited in claim 27 wherein said channel bandwidth information comprises:

a plurality of data ring segment bandwidth parameters each being indicative of an amount of bandwidth currently available at a corresponding one of said data ring segments; and

a plurality of memory unit link bandwidth parameters each being indicative of an amount of bandwidth currently available at a corresponding one of said memory unit links.

30. (Original) A packet switching fabric as recited in claim 28 wherein said transfer announcement information associated with each one of said transfer data packets

further includes source identification information indicating said associated source device.

31. (Original) A packet switching fabric as recited in claim 28 wherein:

said network interface means includes a plurality of transmit buffer queues each providing for receiving data from said destination managing means, and for transmitting bursts of data to a corresponding one of said network links via a corresponding one of said network ports; and

said destination managing means includes an output buffer manager for monitoring the availability of buffer space in each of said transmit buffer queues, and wherein each of said notification messages is transferred via said control ring means after a determination by said output buffer manager that an associated destination one of said transmit buffer queues, that is connected to said associated destination network port, includes a threshold amount of available buffer space.

32. (Original) A packet switching fabric as recited in claim 31 wherein said output buffer manager is operative to determine a number of blocks of buffer space available at each of said transmit buffer queues, each of said available blocks providing buffer space sufficient for receiving a burst of packet data from said destination managing means.

33. (Original) A packet switching fabric as recited in claim 32 wherein said notification information further comprises an initial channel credit value indicating of a number of available blocks at the destination transmit buffer queue associated with said selected transfer data packet prior to transmitting said associated notification message.

34. (Original) A packet switching fabric as recited in claim 33 wherein said patrol message is transferred via said data ring, and wherein said control ring processing means is communicatively coupled with said data ring processing means.

35. (Original) A packet switching fabric as recited in claim 34 wherein said control ring processing means is operative to read selected sets of said data ring segment bandwidth parameters and said memory unit link bandwidth parameters of said patrol message i13 response to said transfer notification information, each of said selected sets of bandwidth parameters being associated with one of said source-destination channel paths, said control ring processing means being further operative to determine a maximum amount of bandwidth currently available for transmitting data via each of said source-destination channel paths based on said associated selected set of bandwidth parameters.

36. (Original) A packet switching fabric as recited in claim 35 wherein said control ring processing means is further operative to determine an initial channel rate value associated with each one of said selected transfer data packets, each said initial channel rate value indicating an initial channel rate for transmitting bursts of said associated selected transfer data packet from said packet buffer means of said associated source device to said associated destination device via said associated source-destination channel path.

37. (Original) A packet switching fabric as recited in claim 36 wherein each of said notification messages comprises:

a destination identification field for carrying said associated destination identification information;

a source identification field for carrying said associated source identification information;

a packet location pointer field for carrying said associated pointer information;

an initial channel credit field for carrying said associated initial channel credit value; and

an initial channel rate field for carrying said associated initial channel rate value.

38. (Original) A packet switching fabric as recited in claim 37 wherein:

said control ring processing means is responsive to received ones of said notification messages, and operative to provide received notification information associated with each one of said received notification messages, said received notification information including said associated source identification information, said associated destination identification information, said associated pointer information, said associated initial channel credit value, and said associated initial channel rate value; and

said source managing means is further responsive to said received notification information, and operative to transfer data bursts of said associated selected transfer data packet from said packet buffer means to said associated destination device via said associated source-destination channel path in accordance with said associated initial credit value and said associated initial channel rate value.

39. (Original) A packet switching fabric as recited in claim 38 wherein said source managing means further comprises:

a source channel control unit responsive to said received notification information, and operative to generate an initial channel data transfer signal associated with each one of said received notification messages, each of said initial channel data transfer signals being repeatedly activated a specified number of times in accordance with said associated initial channel rate value, said specified number being determined based on said associated initial channel credit value; and

a packet buffer control unit communicatively coupled to said packet buffer means and to said network ports, said packet buffer control unit being responsive to said initial channel data transfer signals, and being operative to read said specified number of data bursts of said associated selected transfer data packet from said packet buffer means in accordance with said associated initial channel rate value.

40. (Original) A packet switching fabric as recited in claim 39 wherein said source channel control unit comprises:

a channel memory means responsive to said received notification information, and being operative to manage channel information associated with corresponding ones of said source-destination channel paths, said channel information having,

said associated source identification information, said associated pointer information, a current channel credit value indicative of a number of bursts of said selected data packet to be transmitted via said corresponding source-destination channel path, said current channel credit value being initialized to said initial channel credit value, and

a current channel rate value indicative of a channel rate for transmitting bursts of said selected data packet via said corresponding source-destination channel path, said current channel rate value being initialized to said initial channel rate value; and a channel rate timer associated with said corresponding source-destination channel path, said channel rate timer being responsive to said current channel rate value, and being operative to generate a channel rate control signal that is repeatedly activated in accordance with said current channel rate value.

41. (Original) A packet switching fabric as recited in claim 39 wherein said source channel control unit includes:

a channel memory means responsive to said received notification information, and being operative to manage channel information associated with said selected source-destination channel path, said channel information including said associated source identification information, said associated pointer information, said initial channel credit value, and said initial channel rate value; and

a channel rate timer associated with said selected source-destination channel path, said channel rate timer being responsive to said current channel rate value, and being operative to generate said initial channel data transfer signal.

42. (Original) A packet switching fabric as recited in claim 39 wherein:

said output buffer manager is further operative to generate incremental credit transfer information associated with said selected transfer data packet, said incremental credit transfer information indicating an incremental number of available blocks at said destination transmit buffer queue, said incremental number of available blocks having become available since said transmission of said associated notification message;

said control messages further include incremental credit transfer messages developed by said control ring processing means in response to said incremental credit transfer information, said incremental credit transfer message carrying said incremental credit transfer information;

said control ring processing means is also responsive to terminated ones of said incremental credit transfer messages, and operative to provide received incremental credit transfer information; and

said source channel control unit is responsive to said received incremental credit transfer information, and operative to increase said initial channel credit value.

43. (Original) A packet switching fabric as recited in claim 39 wherein:

said control ring processing means is further operative to generate incremental rate transfer information associated with said selected transfer data packet, said incremental rate transfer information indicating an incremental channel rate, said incremental channel rate being determined based on additional channel bandwidth for transmitting data via said associated source-destination channel path, said additional channel bandwidth being indicated by said patrol message, said additional channel bandwidth having become available since said transmission of said associated notification message;

said control messages further include incremental rate transfer messages developed by said control ring processing means in response to said incremental rate transfer information, said incremental rate transfer message carrying said incremental rate transfer information; and

said control ring processing means is also responsive to terminated ones of said incremental rate transfer messages, and operative to provide received incremental rate transfer information; and

said source channel control unit is responsive to said received incremental rate transfer information, and operative to increase said channel rate.

44. (Previously Presented) A packet switching fabric having a plurality of output queuing controlled switching devices coupled together by a data ring and a control ring so that network links can be communicatively coupled, each said switching device comprising:

data ring processor for transmitting and receiving bursts of data to and from adjacent ones of said devices via said data ring,

a network interface having at least one network port for transmitting and receiving data packets to and from said network links,

a packet buffer for storing the received data packets,

source manager communicatively coupled to said data ring processor, and providing an interface between said network interface and said packet buffer, said source manager being operative to develop pointer information for said received data packets, and also being operative to develop an associated destination one of said network ports associated with each one of said received data packets, the pointer information and the associated destination identification providing local announcement information serving as a local request for access to said associated destination network port, the pointer information and the associated destination associated with each one of said transfer packets providing transfer announcement information,

control ring processor responsive to said transfer announcement information, and operative to transmit and receive control messages to and from adjacent ones of said devices via said control ring, said control messages including announcement messages, said control ring processor also being operative to provide received transfer

announcement information in response to each received one of said announcement messages, said received transfer announcement information serving as a remote request for access to said associated destination network port, and

destination manager communicatively coupled to said network interface, and responsive to said local announcement information and said received transfer announcement information, and operative to arbitrate between competing ones of said local and remote requests for access to each of said network ports, and also operative to generate transfer notification information associated with selected ones of said transfer data packets.

45. (Previously Presented) A packet switching fabric as recited in claim 44 wherein said transfer announcement information associated with each one of said transfer data packets further includes source identification information indicating said associated source device.

46. (Previously Presented) A packet switching fabric as recited in claim 44 wherein:

said network interface includes a plurality of transmit buffer queues each providing for receiving data from said destination manager, and for transmitting bursts of data to a corresponding one of said network links via a corresponding one of said network ports; and

said destination manager includes an output buffer manager for monitoring the availability of buffer space in each of said transmit buffer queues, and wherein each of said notification messages is transferred via said control ring after a determination by said output buffer manager that an associated destination one of said transmit buffer queues, that is connected to said associated destination network port, includes a threshold amount of available buffer space.

47. (Previously Presented) A packet switching fabric as recited in claim 46 wherein said output buffer manager is operative to determine a number of blocks of buffer space available at each of said transmit buffer queues, each of said available blocks providing buffer space sufficient for receiving a burst of packet data from said destination manager.

48. (Previously Presented) A packet switching fabric as recited in claim 47 wherein said notification information further comprises an initial channel credit value indicating of a number of available blocks at the destination transmit buffer queue associated with said selected transfer data packet prior to transmitting said associated notification message.

49. (Previously Presented) A packet switching fabric as recited in claim 44 wherein said packet buffer includes at least one memory unit communicatively coupled with said source manager via a corresponding memory unit link, and wherein each of said devices receives a channel resource patrol message from an adjacent one of said devices, said patrol message carrying channel bandwidth information indicative of bandwidth available on said data ring and bandwidth available on said memory unit links, said control ring processor being responsive to said channel bandwidth information and operative to read and modify said channel bandwidth information for the purpose of managing data transfer via said data ring and via each of said memory unit links.

50. (Previously Presented) A packet switching fabric as recited in claim 44 wherein each of said control messages includes a message field for indicating a message type of said control message.